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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,374	07/10/2001	Charles N. Archie	FIS9-2001-0090	8836
29154	7590	11/02/2004	EXAMINER	
FREDERICK W. GIBB, III MCGINN & GIBB, PLLC 2568-A RIVA ROAD SUITE 304 ANNAPOLIS, MD 21401			JOHNSTON, PHILLIP A	
			ART UNIT	PAPER NUMBER
			2881	

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/902,374

Applicant(s)

ARCHIE, CHARLES N.

Examiner

Phillip A Johnston

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7-10-2001 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

***Detailed Action***

1. This Office Action is submitted in response to Amendment dated 7-28-2004, wherein claims 1-26 have been amended. Claims 1-26 are pending.

***Claims Rejection - 35 U.S. C. 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-26 stand rejected under 35 U.S.C. 102(e) as being clearly anticipated by Su, U. S. Patent No. 6,388,253.

Su (253) discloses the following;

(a) Linking (combining) stepper focus data and critical dimension (CD) data from a plurality of reference samples and generating a CD value from the analysis of the linked data, as recited in claims 1,10,12, and 19. See Column 3, line 52-67; Column 4, line 1-11; and Column 10, line 26-42;

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(b) Establishing a library of reference SEM waveforms and images using various stepper focus settings, as recited in claims 2-7, 11, and 13-18. See Column 4, line 12-67; Column 5, line 1-57; and Column 10, line 43-54;

(c) Storing the reference waveform and image data, and generating the optimum CD value using computer software-implemented data base system 350, as recited in Claims 20-26. See Column 5, line 58-65; and Column 8, line 31-65.

### ***Examiners Response to Arguments***

4. Applicant's arguments filed 7-28-2004 have been fully considered but they are not persuasive.

#### **Argument 1**

Applicant states that "However, the claimed invention as provided in amended independent claims 1, 8, 10, 12, 19, and 20 contain features, which are patentably distinguishable from the prior art reference of record. Specifically, claims 1, 8, 10, 12, 19, and 20 generally provide "combining said stepper focus parameter with a critical dimension measurement to remove structural bias from critical dimension information" in order to generate, an "optimum critical dimension value." "

The applicant is respectfully directed to Su (253), Column 3, line 56-63, which states; According to the methodology of the present invention, after a feature such as an etch mask is formed on a lot or batch of semiconductor wafers at a

"photo cell" by a photolithography process (e.g., exposure at a stepper followed by photoresist development), one or more wafers of the lot are chosen for inspection and the feature is conventionally imaged, typically at several sites on each wafer to be inspected, with a CD-SEM to measure its CD and other sensitive parameters such as edge width and profile grade, and to obtain its SEM waveform. The measured parameters are linked to photolithography adjustable parameters such as stepper focus and exposure settings.

Also Column 4, line 12-35, which states; The links between the measured feature parameters, the photolithography adjustable parameters and etch adjustable parameters is accomplished through "library building".. Specifically, in one embodiment of the present invention, a "library" of reference waveforms, such as conventional SEM waveforms, is created by imaging a plurality of reference features formed, as on a test wafer in the photo cell, using the reticle which will be used in producing the features to be inspected. Each of the reference features is formed using different process parameters, such as different stepper focus and exposure settings. After creating the reference SEM waveforms, the profile of each of the reference features is imaged, if desired, as by a cross-section FIB-SEM. Thus, each reference SEM waveform is associated with known stepper settings and, optionally, a known profile.

Subsequently, the reference waveform associated with the particular cross-section SEM waveform having optimal CD, profile and/or other characteristics is chosen and identified as a "golden waveform".

And Column 5, line 20-34, which states; After exposure of the wafer, the individual exposure sites are developed and then examined with a conventional CD-SEM scan to measure the feature's CD, and the resulting waveforms stored to obtain a reference waveform for each site. The exposure sites can then be imaged, if desired, with an atomic force microscope (AFM) or sectioned and imaged with a cross-section FIB-SEM to determine their respective profiles. An evaluation of the CD, cross-sectional profile images, and other measured parameters is performed to determine the combination of focus and exposure settings, which produces the best feature characteristics. The reference waveform (i.e., conventional SEM waveform) corresponding to the combination of stepper focus and exposure settings that produced the best characteristics is then designated as a golden waveform.

As well as, Column 7, line 16-29, which states; The above embodiment of the present invention has been described relative to a "golden waveform" technique. However, it should be realized that any SEM CD measurement technique capable of correlating an FEM cell (or dEdF) to an etch recipe and to feature profile and/or cross-section can be used to implement the present invention. An example of such a technique is discussed in "An Inverse Scattering Approach to SEM Line Width Measurements", Mark P. Davidson and Andras E. Vladar, Proceedings of SPIE, Vol 3677 (1999), the entire disclosure of which is hereby incorporated by reference. In this technique, SEM waveforms are matched to a library of Monte Carlo simulations to predict the sidewall shape and dimensions of a feature (i.e., the feature profile).

The examiner has interpreted from the Su (253) references above that Su (253) generates "golden waveforms", reference waveforms for comparison to CD waveforms measured in-process. The reference "golden" waveform profiles are defined by measuring feature dimensions on samples having the best (most correct and acceptable) feature characteristics created from the combination of focus and exposure settings. FIB-SEM measurements are performed on these reference samples after cross-sectioning, which provides the reference feature profile experimental data. The experimental reference "golden" feature profile data is then correlated to a specific sidewall shape and dimension via Monte Carlo simulations. As a result, the Su (253) approach of basing CD reference "golden" feature dimensions upon cross-sectioned profiles is clearly equivalent to the removal of structural bias from CD information, as recited in claims 1,8,10,12,19, and 20.

#### Arguments 2-4

Applicant states that, "However and most significantly, Su does not teach how to improve (optimize) upon the critical dimension measurement itself."

Also that, "Su does not describe how to make a more accurate CD measurement."

And that, "Waveforms can differ because of changes in many of the feature properties but Su fails to teach how to weigh this information to extract the CD free of the secondary characteristics of the profile."

In response to applicant's arguments above that the reference Su fails to show certain features of applicant's invention, it is noted that the features upon which

applicant relies (i.e., optimizing and making a more accurate CD measurement) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

### **Conclusion**

5. The Amendment filed on 7-28-2004 under 37 CFR 1.131 has been considered but is ineffective to overcome the Su (253) references.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to

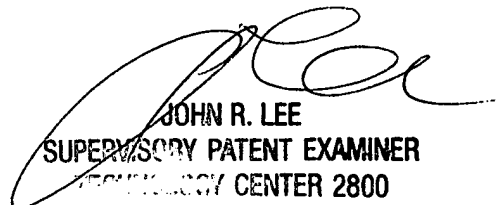


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reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (571) 272-2477. The fax phone number for the organization where the application or proceeding is assigned is 703 872 9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PJ  
October 26, 2004



JOHN R. LEE  
SUPERVISORY PATENT EXAMINER  
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